

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II-B.TECH-I-Semester End Examinations (Regular) - December- 2024
SIGNALS AND SYSTEMS
(ECE)

[Time: 3 Hours]

[Max. Marks: 60]

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 10 marks. Answer all questions in Part A.

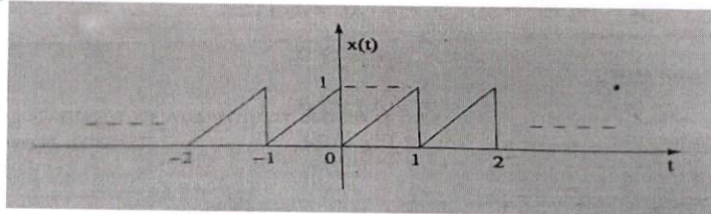
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A**(10 Marks)**

1. a) Define a system. What are the classifications of systems? [1M]
- b) Define Energy and Power signal. [1M]
- c) What are Dirichlet conditions of Fourier transform? [1M]
- d) Find the Fourier transform of a signal $x(t) = \delta(t)$. [1M]
- e) What is signal band width? [1M]
- f) Write condition for Poly-Wiener criterion. [1M]
- g) Illustrate Region of Convergence (ROC) of Laplace transform. [1M]
- h) Write Time scaling property of Laplace transform. [1M]
- i) What is meant by Aliasing? [1M]
- j) What is Convolution and Correlation? [1M]

PART-B**(50 Marks)**

2. Derive an expression for computing Mean Square Error in approximating a function $f(t)$ by a set of n orthogonal functions. [10M]
- OR**
3. Find which of the following signals are causal or non-causal: [10M]
 (i) $x(t) = e^{-2t} u(t-2)$ (ii) $x(t) = u(t+2) - u(t-2)$
 4. Find the trigonometric Fourier series for the periodic signal $x(t) = t$ $0 \leq t \leq 1$ and repeats every 1 sec. [10M]

**OR**

5. State and prove any five properties of Fourier transform. [10M]
 6. Explain the ideal filter characteristics of linear system. [10M]
- OR**
7. Define Rise time and Bandwidth. Derive the relationship between them. [10M]

8. Find $y(t) = x_1(t) * x_2(t)$ where $x_1(t)$ and $x_2(t)$ is given as: $x_1(t) = u(t+2)$ and $x_2(t) = u(t-3)$ using graphical convolution method. [10M]

OR

9. Find the z-transform and ROC for the following signals: [10M]
(i) $x(n) = u(n)$ (ii) $x(n) = \delta(n)$ (iii) $x(n) = [\cos\omega_0 n] u(n)$.

10. State and prove sampling theorem for band limited signal with neat spectral sketches. [10M]

OR

11. Derive the relation between Power Spectrum and Auto Correlation Function. [10M]
